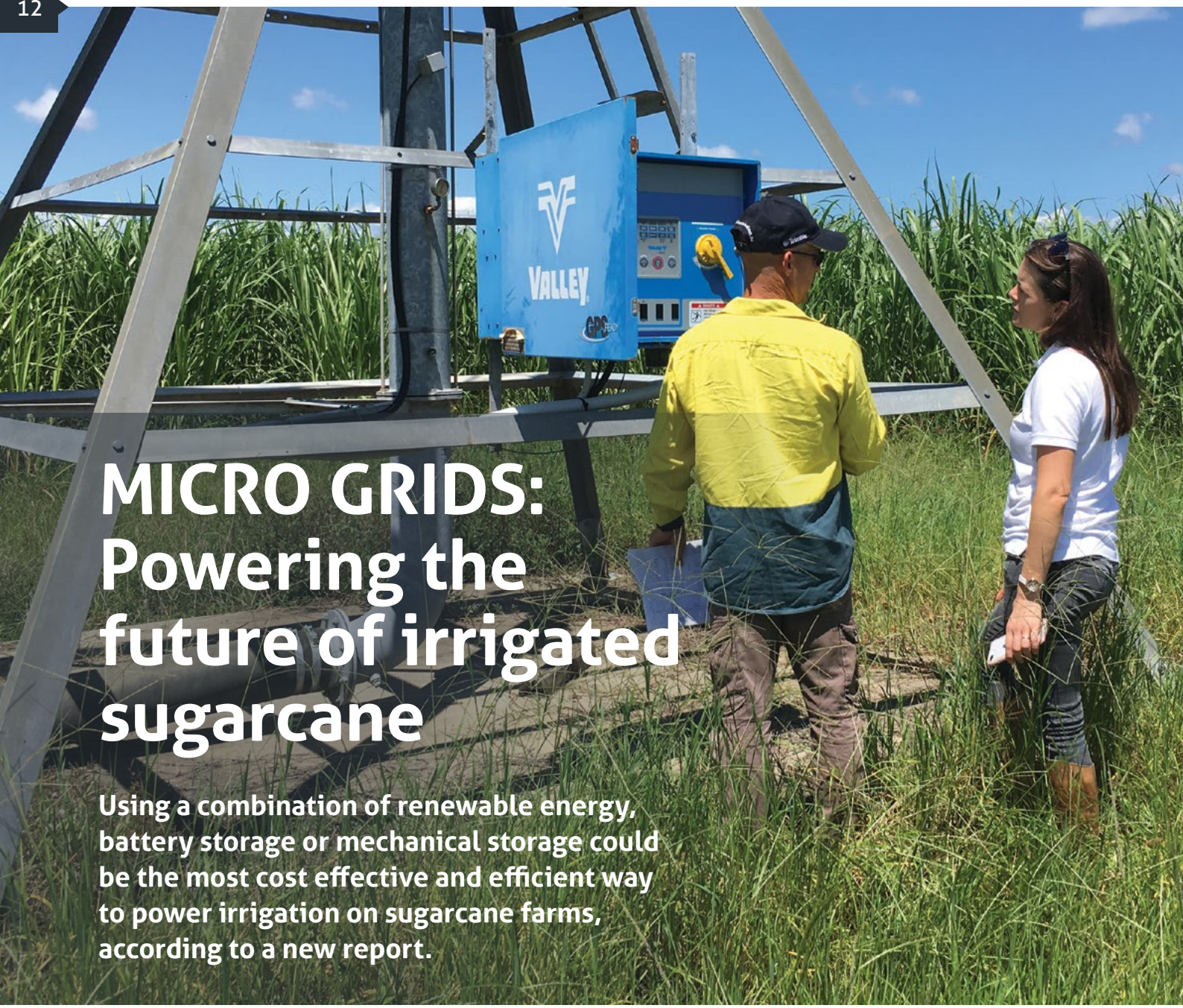


MICRO GRIDS: Powering the future of irrigated sugarcane

Using a combination of renewable energy, battery storage or mechanical storage could be the most cost effective and efficient way to power irrigation on sugarcane farms, according to a new report.

The study, commissioned by SRA and conducted by AgEcon, looked at opportunities for energy innovation in irrigated sugarcane and found that new energy technologies could deliver reduced per megalitre (ML) pumping costs and lower carbon emissions.

Study co-author, Janine Powell, a research economist with AgEcon, said the research findings were important because the energy used to power irrigation is one of the fastest growing costs for growers.

"In Queensland, electricity costs have increased by about 400 percent since the year 2000," Ms Powell said.

The study found the cost of energy to power irrigation on cane farms can account for about one-third of the total cost of growing cane and 22 percent of the carbon emissions of raw sugar.

"Growers are looking for ways to improve their bottom line and minimise their impact on the environment," Ms Powell added.

"Our analysis included an examination of current energy use on irrigated sugarcane farms and plans to explore the feasibility of implementing new energy technologies in the future to reduce costs and improve sustainability."

AgEcon surveyed the energy use of 115 irrigated farms across ten regions.

The survey results indicated the most energy intensive irrigation systems were the high-pressure overhead or "water cannon" systems pumped from a ground water source. In this scenario, irrigation accounted for 33 percent of the variable costs compared to 10 percent for furrow irrigation pumped from river water.

The survey results added to a meta-analysis of other available sources on pumping and irrigation by region. The Burdekin, Mackay and Bundaberg regions had the highest energy use of irrigation water with just over half of the industry's irrigation water transferred in the Burdekin.

Ms Powell said this highlights the importance of resourcing future energy productivity solutions.

"Our study found that with a 15 percent electricity price increase, the gross margin for farmers who used high pressure overhead water pumped from a bore, was reduced by 9 percent," she said.

"Farmers who have optimal irrigation systems and good water use efficiency metrics in this situation could consider new energy technologies to reduce pumping costs and improve overall energy efficiency".

"In Queensland, electricity costs have increased by about 400 percent since the year 2000"

Mackay district irrigator Wayne Vickers agrees that the industry needs to be looking into new ways to reduce both the cost of irrigating and the impact on the environment.

Mr Vickers grows 170ha of irrigated cane and uses low pressure overhead and furrow systems pumped from the Pioneer River near Marian.

"I jumped at the opportunity to participate in the case study as input costs, especially electricity, are always increasing and we need to be constantly looking at ways to be more efficient while maintaining productivity and managing our effect on the environment," he said.

Ian Dart, who is responsible for innovation and cost reduction strategies for Bundaberg Sugar, says while Bundaberg Sugar uses a combination of high and low pressure overhead, flood and drip irrigation systems they were also keen to find out how pumping costs can be reduced.

"We are constantly looking at ways we can innovate, but until this point switching to a renewable energy source like solar has not been cost effective nor reliable enough to consider," he said.

The AgEcon survey results suggested that a lack of knowledge around energy, renewables, investment feasibilities and a perceived lack of cashflow are the main limiting factors for investment into new energy technologies.

"Analysing the impact of your irrigation system on your bottom line and how exposed you are to energy price increases is a useful exercise in determining how feasible a change in power source might be for your farm," Ms Powell said.

Micro-Grids

The energy technologies most applicable to sugarcane irrigators will likely be pump-site "micro-grids", said study co-author Jon Welsh, a research economist with AgEcon.

"Micro-grids are clusters of generators which are operated as single controllable entities," Mr Welsh explained.

"For example, a pump-site micro-grid might include a renewable energy source such as solar panels, combined with a lithium-ion battery for storage as well as being connected to power from the electricity grid.

"The power sources are controlled by drive systems to ensure voltages are stabilised at the load source."

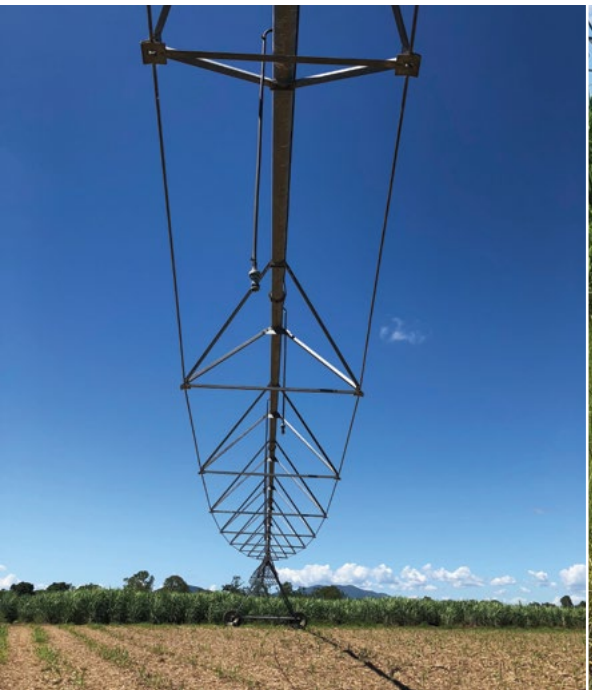
Mr Welsh said with prices of flow and lithium-ion batteries forecast to be reduced by almost 60 percent in the next decade or so, the potential for irrigation farms to adopt these technologies was becoming more feasible.

"These kinds of solutions can provide a hedge of current energy sources used on farm," he said.

Mr Welsh added that advanced battery storage systems could facilitate the integration of renewable power generation into existing irrigation systems through their ability to manage frequency variations and handle peak loads.

"There is real potential for new energy technologies to reduce per ML pumping costs, thereby increasing industry competitiveness and improving sustainability. ■

(Over Page) Mackay grower Wayne Vickers discusses energy solutions with Janine Powell, AgEcon.
(Below Left) Wayne Vickers's centre pivot.
(Below Right) Mackay district grower Wayne Vickers says the industry needs to be looking at new ways to reduce the cost of irrigating, and the impact on the environment.



The full AgEcon report "Opportunities for Energy Innovation in Irrigated Sugarcane" is available on the link:
https://sugarresearch.com.au/wp-content/uploads/2018/01/Energy-in-irrigated-cane_2017x.pdf